THE HABITATS OF THE RARER FERNS OF ALABAMA.

(WITH PLATE XXI)

INTEREST naturally attaches to any species of plants that grow near the borders of their geographic range. For this reason Alabama presents special interest to the student of ferns, because it is the southern limit of quite a number of ferns of the northern states, and also the northern limit of a few of the stragglers that come up from the south. The range of elevation, from the extreme lowlands of the Gulf region to the spurs of the Appalachian system that penetrate the state even beyond its center, is sufficient to give us a somewhat varied fern flora. Some forty species occur in the state exclusive of five species of Ophioglossaceæ.

The early exploration of the state was conducted by Judge Thomas M. Peters, and in later years Professor Eugene A. Smith and more especially Dr. Charles Mohr have the higher flora well in hand. I have been able to add to their list only a single species from the vicinity of Auburn, in the handsome swamp fern, *Dryopteris Floridana*, hitherto known only from Florida, where it is not uncommon. I am able also to reinstate a very distinct species of Botrychium which for many years has been masquerading under a false name. I give the characters and synonymy as follows:

BOTRYCHIUM BITERNATUM (Lam.).

Osmunda biternata Lam. Encyc. Meth. Botanique **4**:650. 1797.

Botrypus lunarioides Michx. Flora **2**:274. 1803.

Botrychium lunarioides Swz. Syn. Fil. 172. 1806 (not Gray: Manual, etc.).

Botrychium ternatum var. *lunarioides* D. C. Eaton, Ferns of N. Am. **1**:148. *pl. 20, f. 3.* 1879.

Sporophyte with fleshy roots from which rises a short common stalk 1.5^{cm} or less high, bearing a nearly sessile broadly triangular ternately compound leaf 8 to 10^{cm} wide, 5^{cm} long; middle division slightly larger than the lateral ones and like them nearly bipinnate; ultimate divisions somewhat lunate, usually not exceeding 5 to 6^{mm} in width, the outer margin crenulate, the lateral margins decurrent into the short branches of the rachis: sporophyll on a rather stout slightly elongate stalk (8^{cm} or more long), bipinnate, with a rather broad rachis: spores pale alutaceous, 39 to 44 μ in diameter: bud for the succeeding year enclosed in the base of the common stalk, smooth, the segments nearly erect or with the apices barely incurved.

Spores maturing in early spring (February or March in the latitude of southern and central Alabama). *Plate XXI.*

The plant was first collected by Michaux in South Carolina, and was described by Lamarck under the name of *Osmunda biternata.* Seven years later Michaux himself described it under the name of *Botrypus lunarioides*, while Swartz referred it to *Botrychium*, but unfortunately under the later name. Later writers confused all our northern forms that now constitute the somewhat variable *Botrychium ternatum* of our manuals under Michaux's name. Professor D. C. Eaton clearly distinguished this form and figured it in his *Ferns of North America,* but overlooked its very distinct leaf and bud characters, and supposed that its time of maturity was due to its southern station. As a matter of fact the true *Botrychium ternatum* is comparatively common in central Alabama, and produces its mature spores late in the season (August to October), the same as it does farther north. In Alabama the stations where *B. ternatum* is found are very different from those affected by this species. *B. ternatum* grows in moist places, frequently near the smaller water courses, while *B. biternatum* is found on dry, usually grassy, knolls, or dry pastures.

My attention was called first to the unusual fruiting time of this species by Dr. Mohr, while looking through his collection of ferns last winter. He regarded the form as found at Mobile as a distinct species. In the following March I found a single plant growing on a grassy knoll in Auburn, when I recognized clearly the distinctness of the species, and this conclusion has been fully confirmed by the bud characters as well as the spores. I find several specimens from South Carolina in the collection of Columbia University, and shall be glad to know of its further occurrence, since our present knowledge of its distribution limits it to these two states and Georgia, which was the source of Eaton's figure above cited.[3] Judging from the single specimen found by myself, collectors will have to get down on their knees more if they expect to find this plant, and the same is true of some of the other small Ophioglossaceæ of the Gulf states.

The species is readily distinguished from *B. ternatum* by its nearly sessile and more compound sterile leaf, as well as by the form of its ultimate divisions, which are distinctly rounded and short, lacking the characteristic long, more or less pointed form common to that species. Its time of maturing its spores also clearly distinguishes it from *B. ternatum*. Moreover, *B. ternatum* is characterized by its hairy bud, a character which is constant in Alabama specimens, while the bud of *B. biternatum* is smooth.

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[3] Eaton's figure represents a small and possibly immature plant.

There are some other distinct species that have been lumped with *B. ternatum* which must be separated, if indeed our northern species is the real *B. ternatum* Thunb. originally described from Japan; one of these species at least is American, but I wait for additional material to confirm this view. It is almost incomprehensible how such entirely distinct species can be thrown together in composites as has been repeatedly done by the English authorities on ferns. This is the common condition met with by any one who undertakes the study of these plants in their native haunts the world over. Jenman has found this true in Jamaica; Mr. Davenport and myself in Mexico; and I have found the same thing in a recent study of Hawaiian ferns.

Another interesting find in the vicinity of Auburn is the rare *Ophioglossum crotalophoroides*, which occurs in low grassy bottoms, and is occasionally found on gentle grassy slopes. It grows with its bulb deeply buried in the earth, the base of the sterile leaf barely rising above the surface. This station is the farthest inland the plant has yet been found.

The common ferns of central Alabama, aside from the ubiquitous *Pteris aquilina*, and *Polypodium polypodioides* on tree trunks and rocks, are *Woodwardia areolata*, *Asplenium filix-fœmina*, *A. platyneuron*, and *Dryopteris acrostichoides*, the latter almost at its southern limit. *Cheilanthes lanosa* is abundant on metamorphic rocks, *Woodsia obtusa* is occasional along streams, while *Dryopteris Noveboracensis* is occasionally found in damp woods; rarely *Dryopteris patens* will be found in exceptionally moist places; *Dryopteris Thelypteris* regularly and *Onoclea sensibilis* and *Phegopteris hexagonoptera* occasionally inhabit the open marshes. Of the Osmundaceæ, *O. regalis* and *O. cinnamomea* are not uncommon. These data apply more especially to the eastern central portion, and more particularly to the vicinity of Auburn in Lee county. Here we have an elevation of something like eight hundred feet, and this ridge forms almost the extreme extension of the Appalachian chain. As we descend from this elevation a few miles to the southward and westward, the more northern species disappear and only the species of the southern lowlands remain.

It is, however, the northern and northwestern portion of the state that presents more of interest to the fern hunter as well as to the botanist interested in any branch of the subject.

Two exceedingly interesting localities were visited during the months of May and June of the present year, and a considerable series of rare and interesting species were obtained, which have been distributed to the leading herbaria.

The first of these localities visited was Havana glen, which had been known as one of the stations of the rare *Asplenium ebenoides*, collected here many years ago by Miss Julia Tutwiler. Havana is a hamlet of a half dozen houses and shanties, in Hale county, and is reached by private conveyance either from Stewart's or Akron on the Alabama Great Southern railway. The glen is a deep gorge cut in a conglomerate rock, well wooded and shaded. Here, in addition to the ferns mentioned above, we find *Dryopteris marginalis*, commonly reduced in size so that mature spore-bearing fronds six inches long are not uncommon; also *Adiantum pedatum*, and on the rocks *Asplenium trichomanes* and *Camptosorus rhizophyllus;* here, too, we find *Botrychium Virginianum* of normal size. But the object of our search is here in considerable quantity, in fact the commonest fern of the glen, *Asplenium ebenoides*, originally discovered along the Wissahickon near Philadelphia, reported from a dozen stations ranging all the way from Canaan, Connecticut, to Hanover, Indiana, and southward, but, so far as I can discover, nowhere found in any quantity. Many have regarded it a hybrid, but the display of the species at Havana clearly demonstrates that it is not a hybrid at all. Its nearest congener is *Asplenium pinnatifidum*, but the frond is much thinner and more irregular than that species. In habit, however, it is very close to that species, growing far under overhanging rocks; in this respect it is totally unlike both *A. platyneuron* and *Camptosorus rhizophyllus*, its supposed parents. It appears to be multiplying, as many young plants were seen in the rock crevices. This myth of hybridity may be put aside, for *Asplenium ebenoides* is as clearly defined a species as we possess in the genus Asplenium, and has no near relations outside of its own genus.

The other habitat for the rarer ferns of Alabama is the old collecting ground of Judge Peters, and the type locality of *Trichomanes Petersii*, which will rank as the rarest as well as the most minute representative of its order in the country. Winston county, Alabama, noted for being one of the few Republican counties in the state and for the possession of only a single family of blacks, is a wild unsettled region toward the northwestern portion of the state, with a railroad crossing it at its southwestern corner. It must therefore be reached, if at all, by private conveyance. It is about equally near to Cullman and Decatur, and from either place would require a ride of about forty miles over a rough mountain road. It could also be reached from Haleysville, whence we made our exit, but railroad connection is uncertain in this direction, as we found, being obliged to wait twenty-one hours for a train. The distance in this direction is only about twenty-five miles, but the means of transit are mostly in the form of sharp-angled mules, and if the streams are "swimming" you are not certain to reach your destination the same day, or even the same week, particularly if you have any desire to keep your collections dry.

The people, as might be supposed, are primitive in their habits as well as quaint in their language, but are hospitable, and will share with you their best accommodations, and treat you well if you are not prone to show too much anxiety as to the place where they manufacture "mountain dew," a product of the mountains which is not mythical! In their gardens they cultivate old English herbs that are rarely seen elsewhere in this country, and they preserve many of the old English expressions and forms of speech. The region is heavily timbered, with very little cleared land, and the flora is of exceeding interest. It is the home of the magnolia, no less than five species growing here, one of them with leaves that often measure three feet in length and nearly half as wide as long. Most of the trees are of the deciduous types, with occasional areas of pine and a few hemlocks scattered among the ravines.

Here we find more of the northern types of ferns, among them many of the common ferns of the northern states. Among them are *Polypodium vulgare*, *Dryopteris spinulosa intermedia*, *Asplenium thelypteroides*, *A. angustifolium*, in addition to most of those mentioned above which are here in greater abundance. Nowhere, however, do we find anything of the profusion of ferns so common in the woodlands of the New England and Middle states. On the rocks, if limestone, we find *Pellæa atropurpurea*, which a little farther east (near Huntsville and Fort Payne) rendered us a most interesting series of young plants, commencing with cordate entire leaves, varying with age to broadly triangular hastate, and later developing forms that are made up of three pinnæ, the terminal one often very broad and hastate, as in the case of the earlier simple ones.

On the sandstones and shales we find *Asplenium pinnatifidum* and *A. montanum* in great abundance. In similar formations, usually in dark shaded ravines and underneath broad shelving rocks, deep in the darkest recesses, *Trichomanes radicans* grows in the greatest profusion. Nowhere within our experience in this country does the tropical character of fern vegetation manifest itself more strikingly than it does here under these dark and gloomy shelves where, in a minimum of light, beds of this filmy fern twenty feet long and two or three feet wide thrive in the slight but perpetual drip of the water that percolates through the rocks. Not even in the swamps and sink-holes of southern Florida, where the ferns of the tropics still persist in greater variety, is there so striking an impression of tropical luxuriance and the peculiar clammy moisture that one expects in tropical vegetation.

The rarest fern to find, however, even when you are near its station, is the elegant *Trichomanes Petersii.* Within the section[4] that contains the type locality it took two days of very earnest search to find it. From the description of the original station I had expected to find it "on rocks wet with the spray of waterfalls," but all such over moist localities yielded no returns. When I had almost given up the search I found it at last creeping under the roof of shelving rocks, sending up at intervals of one or two centimeters its tiny fronds that look more like the leaves of a large *Mnium* than a fern; it occasionally forms matted masses of fronds like those distributed by Judge Peters years ago, but it is distinctively a creeping plant. I learn from Dr. Mohr that the plant is found at one or two other stations, but so far it is not known outside of Alabama. Its minute size, however, and its unusual habitat would evade one not familiar with its habits, and it may have a wider distribution than I now suspect for it. But before these things will be known we need any number of people, call them botanists or what you may, who know plants, their haunts and habits, who love the fields and woods and search them with the zeal that prompted Peters and Beaumont and the other earlier botanists of Alabama to make known their native flora.—LUCIEN M. UNDERWOOD, *Auburn, Ala.*, now of *Columbia University.*

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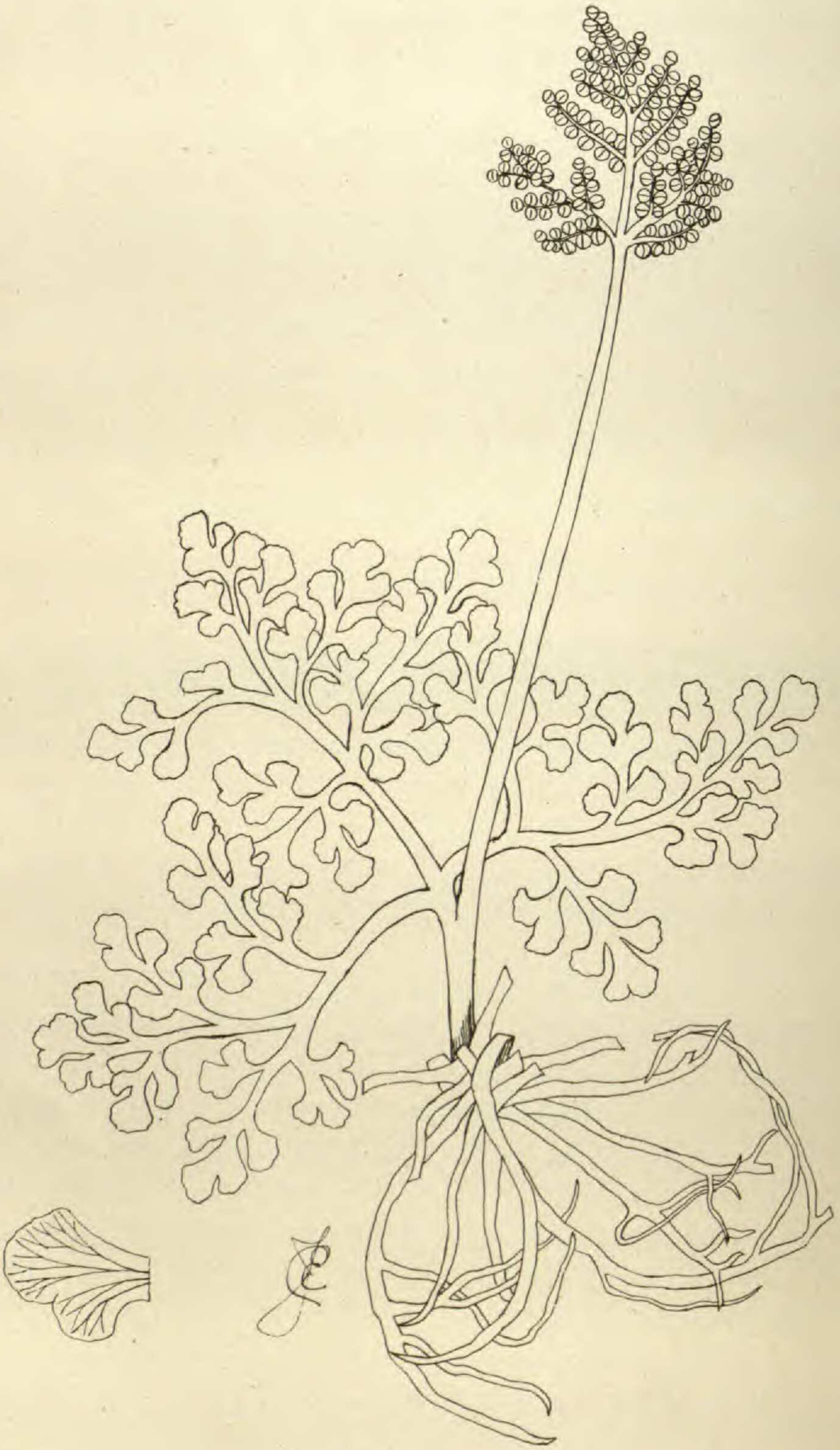
[4] T. 8. R. 9. Sect. 10, Winston county.



BOTRYCHIUM BITERNATUM (Lam.) Underw.